Aerosol size distributions – nucleation to coarse mode

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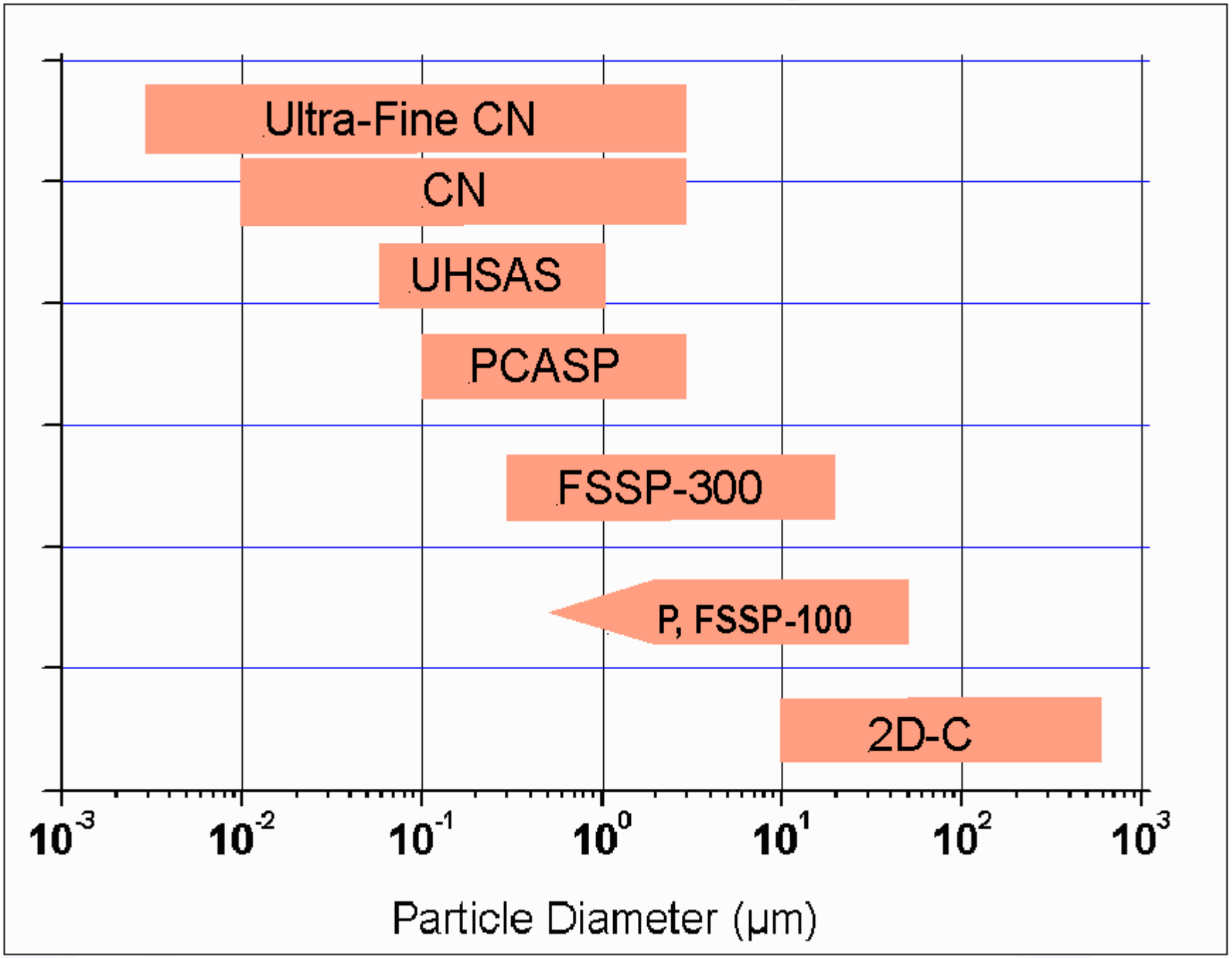
Aerosols & TORERO science goals

- Vertical distribution of aerosol particles
- Stable layers & stratification
- Sources, transport & mixing of particles
  - *especially new formation*
  - *association with trace gas data*
- Scavenging/removal processes

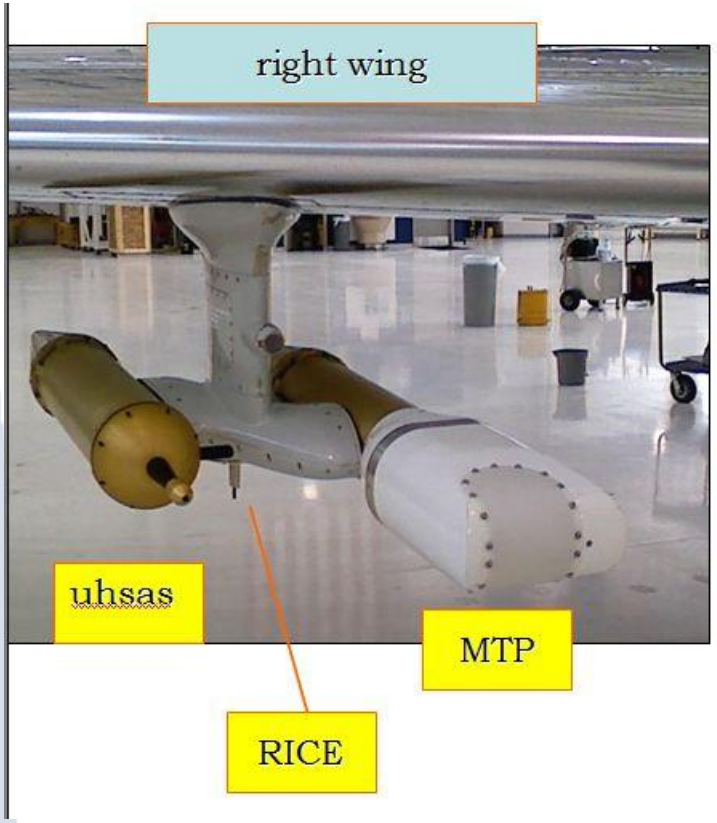
Probe Size Ranges

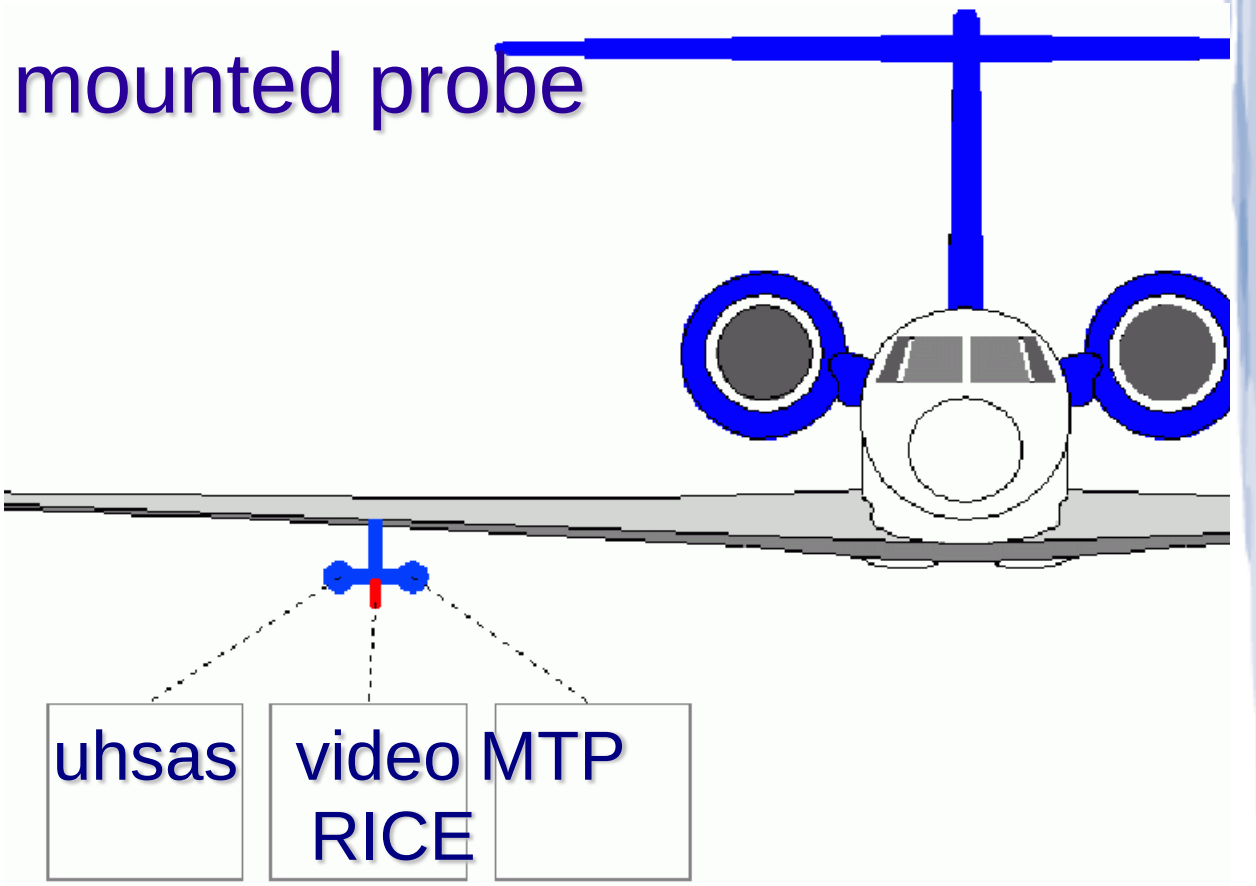


UHSAS –
Ultra-High Sensitivity Aerosol Spectrometer

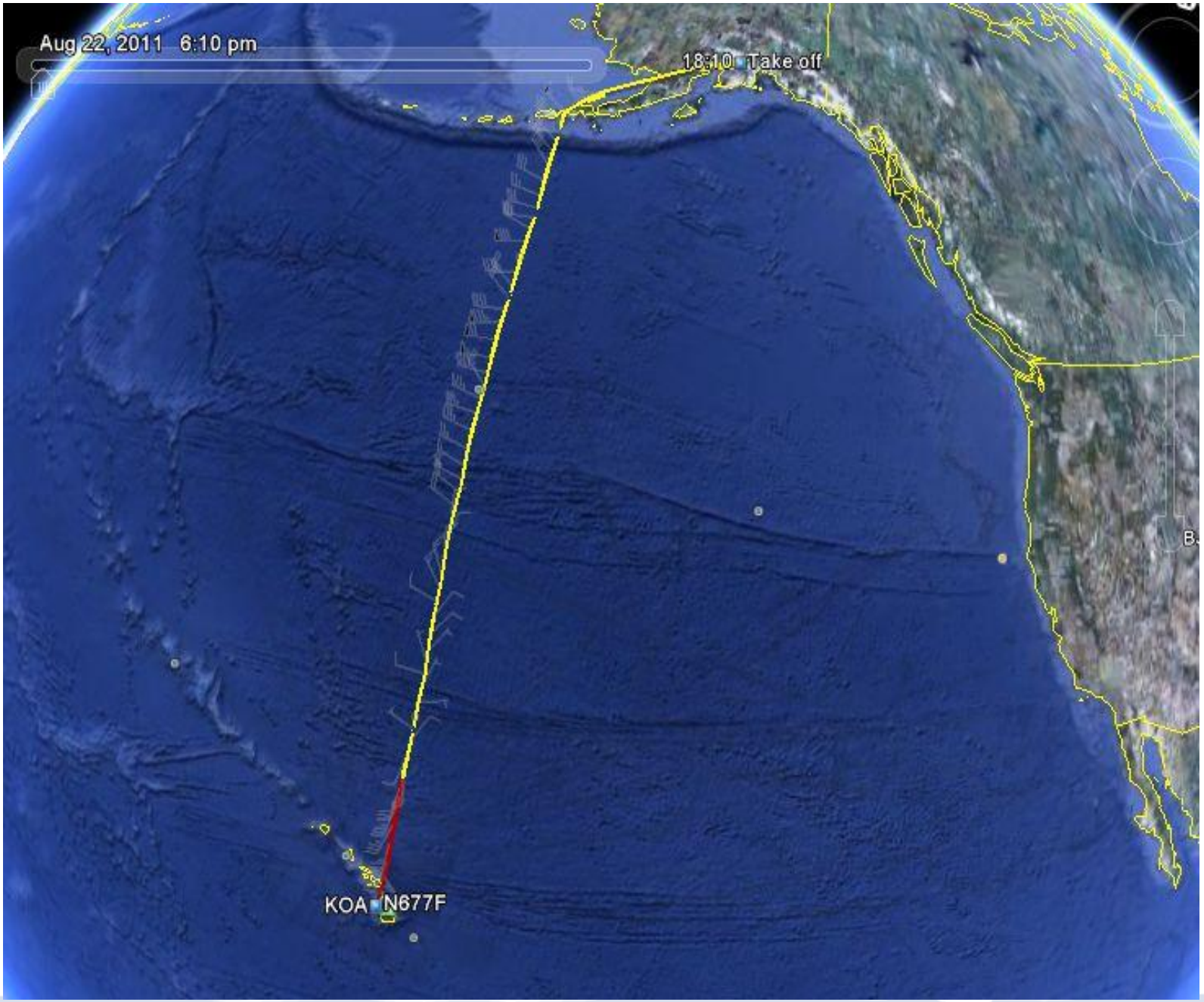
- Canister mount on GV r-wing
- 60 – 1,000 nm in 100 size bins, 10 sps
- resolution ~1%
- calibrate size with PSL spheres
- On-board operator not needed

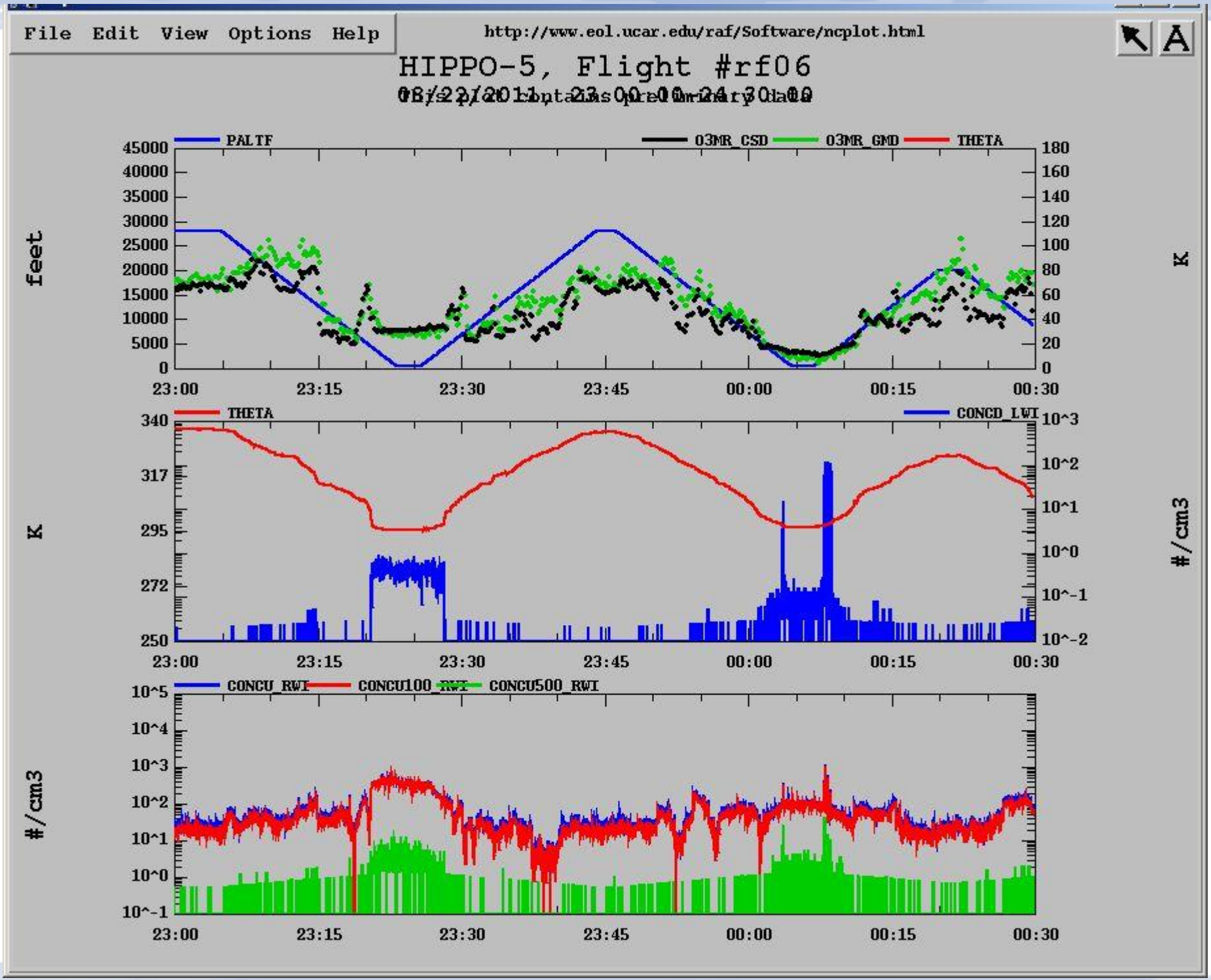
UHSAS = wing mounted probe





UHSAS data, HIPPO-5

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http://www.eol.ucar.edu/raf/Software/ncplot.html
HIPPO-5, Flight #rf06
PALTF
O3MR_CSD
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140
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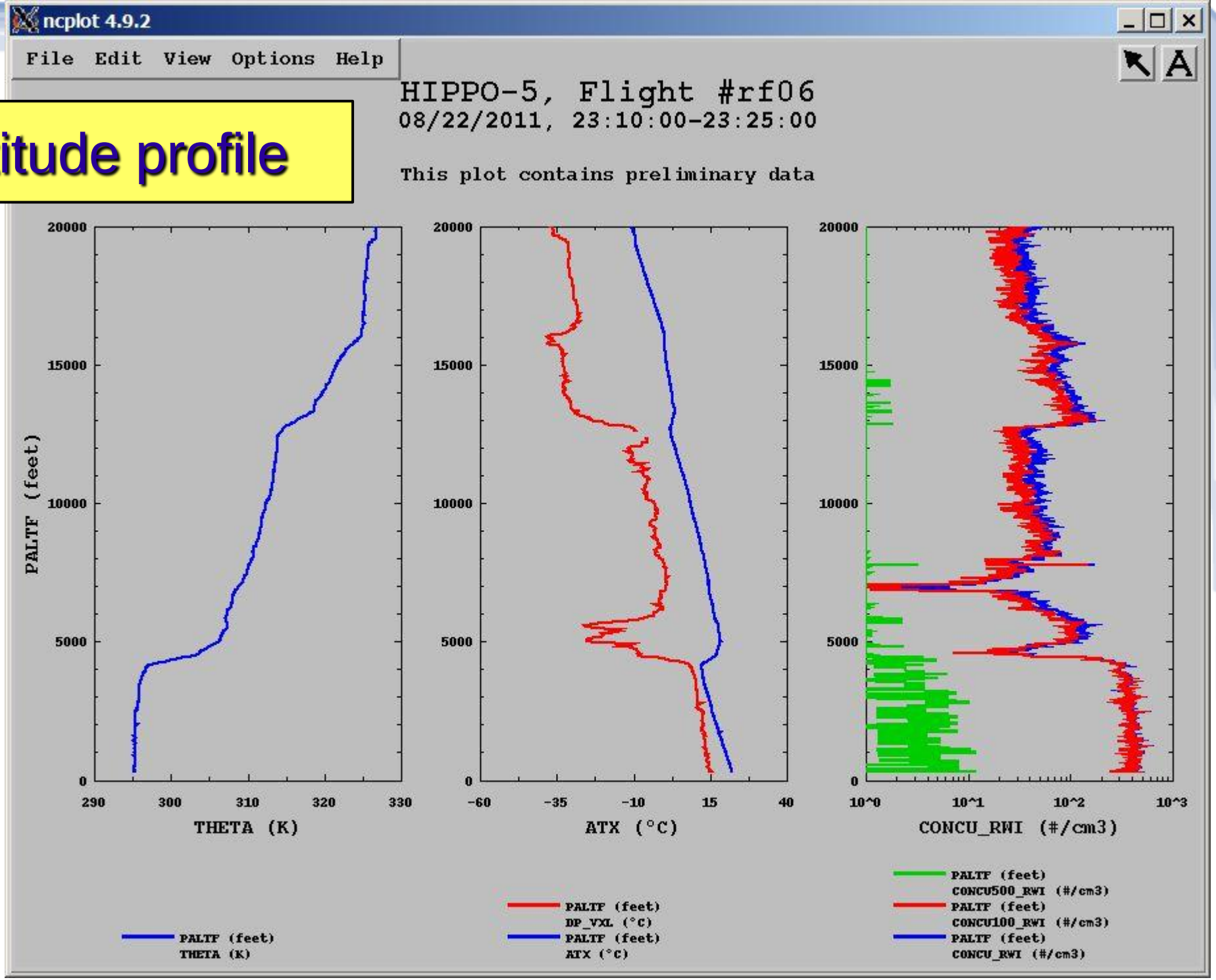
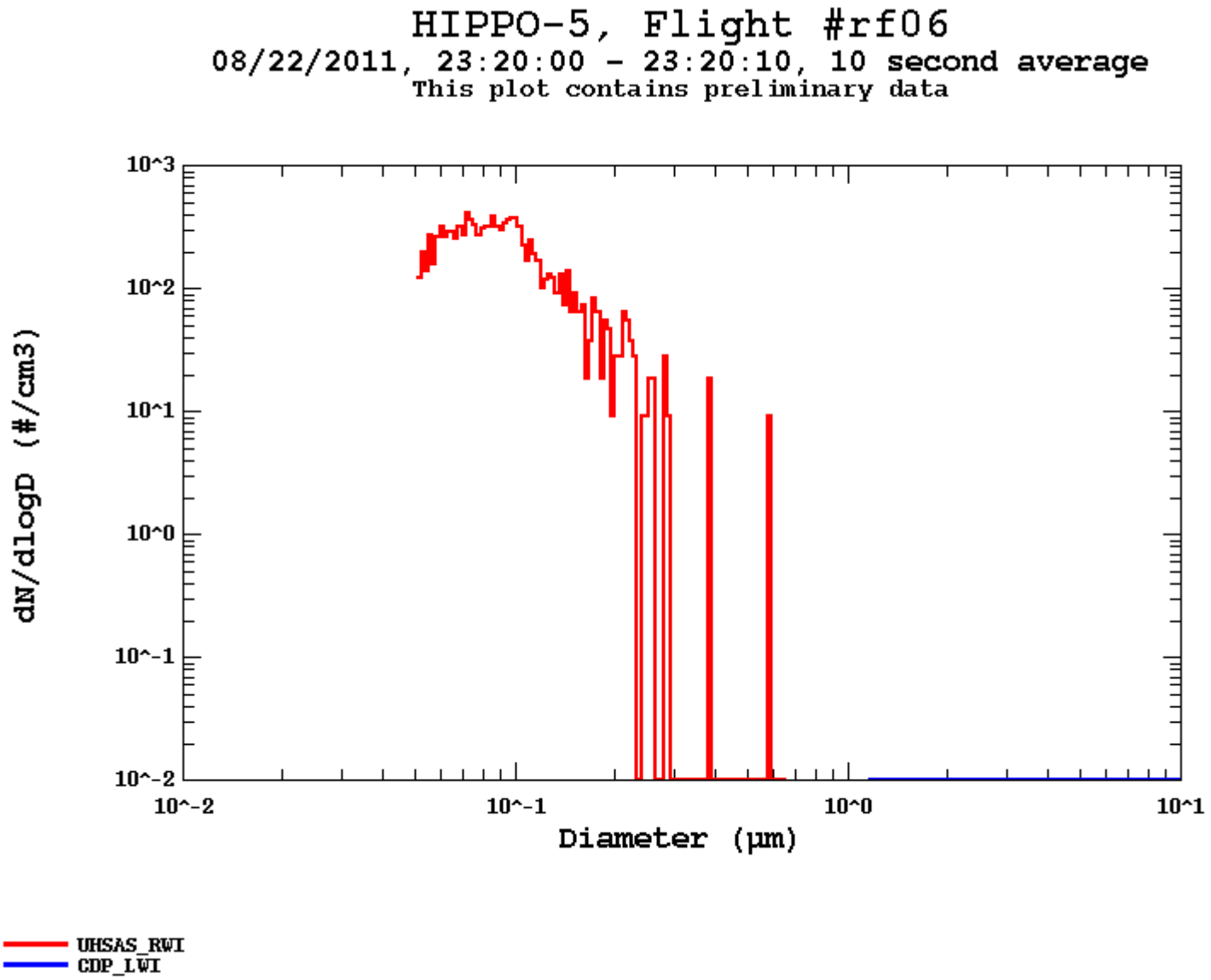
THETA
CONCD_LWI
340
317
295
272
250
10^3
10^2
10^1
10^0
10^-1
10^-2
#/cm3
CONCU_RWI
CONCU100_RWI
CONCU500_RWI
10^5
10^4
10^3
10^2
10^1
10^0
10^-1

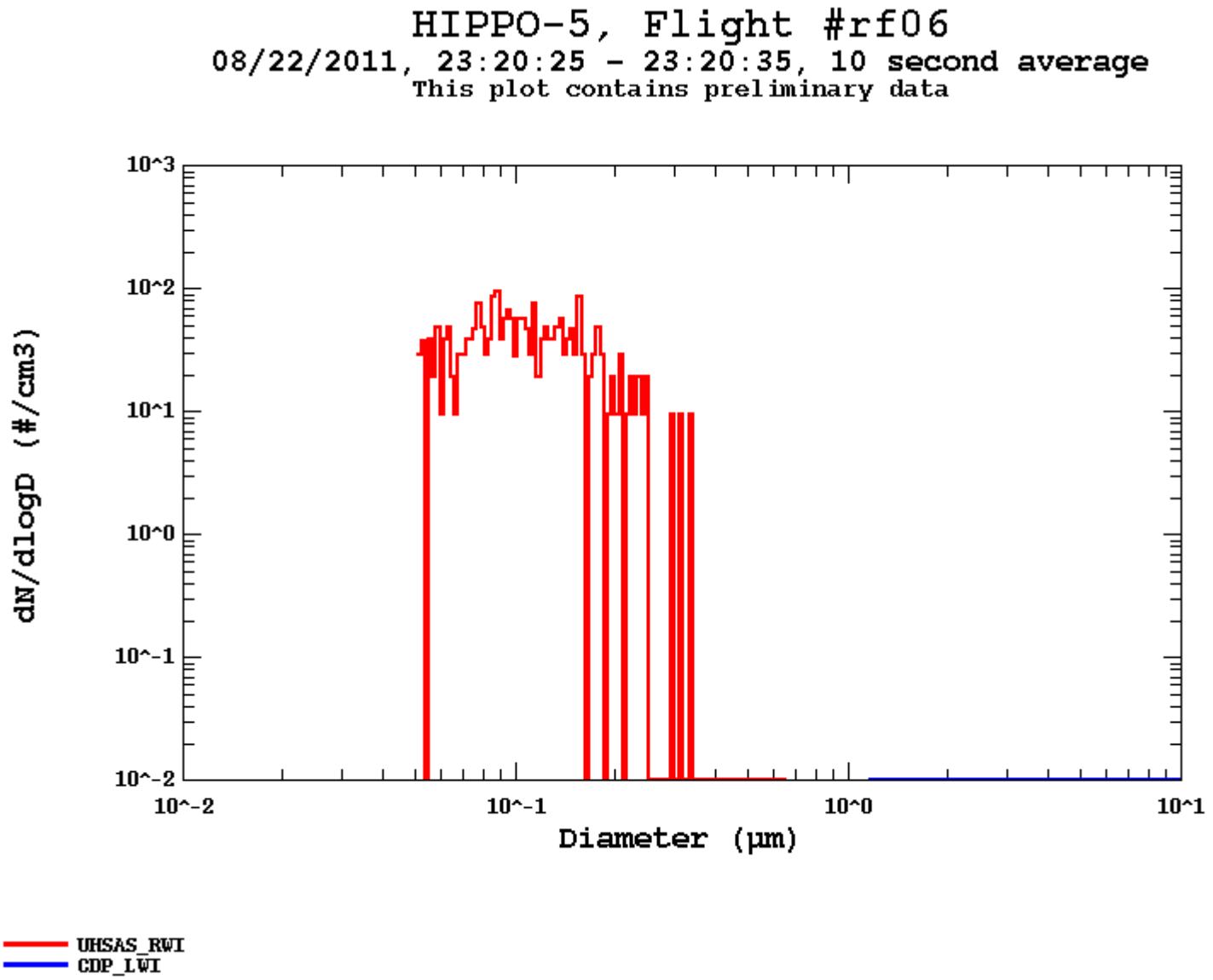
Altitude profile



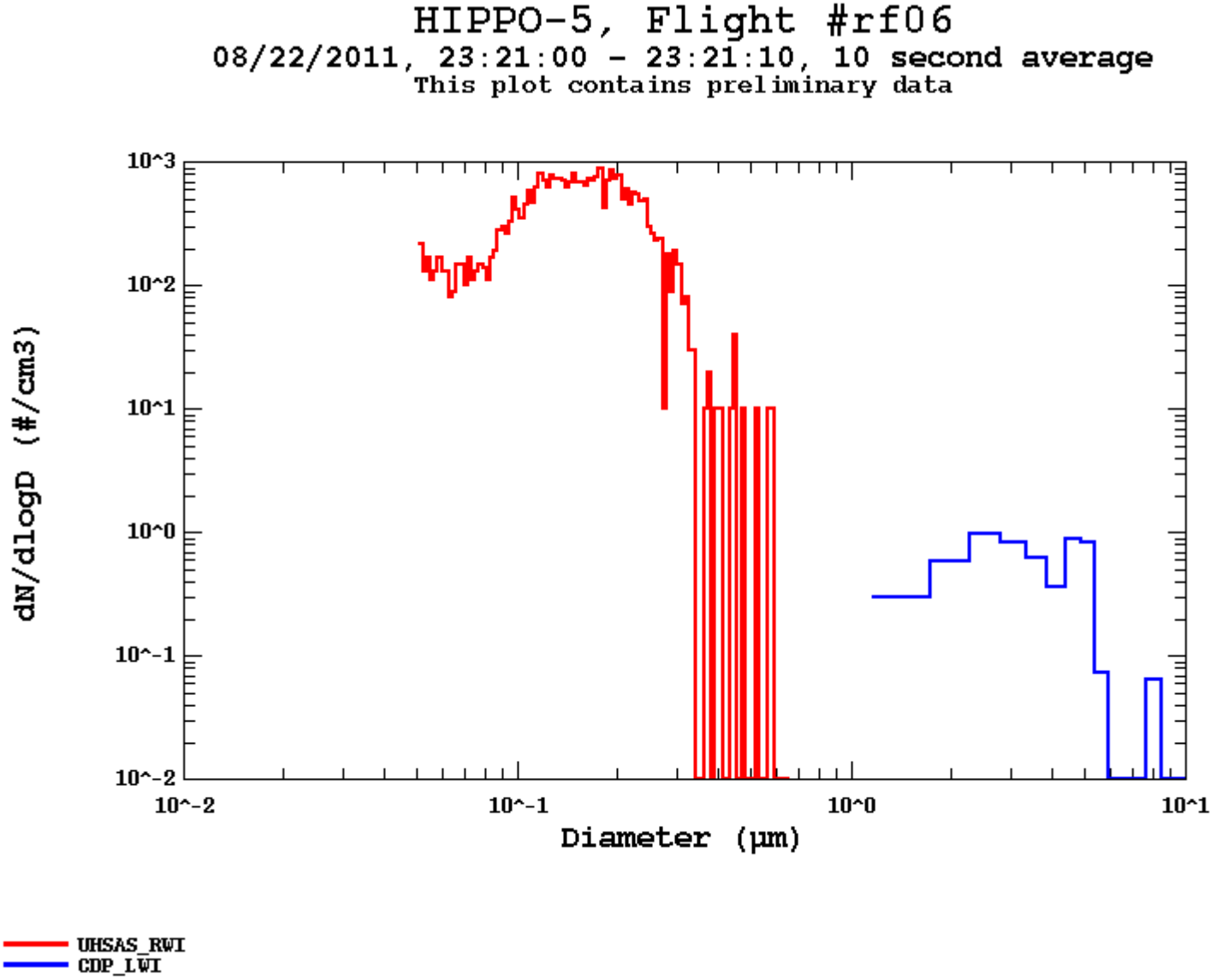
Size distributions, altitude profile



Size distributions, altitude profile



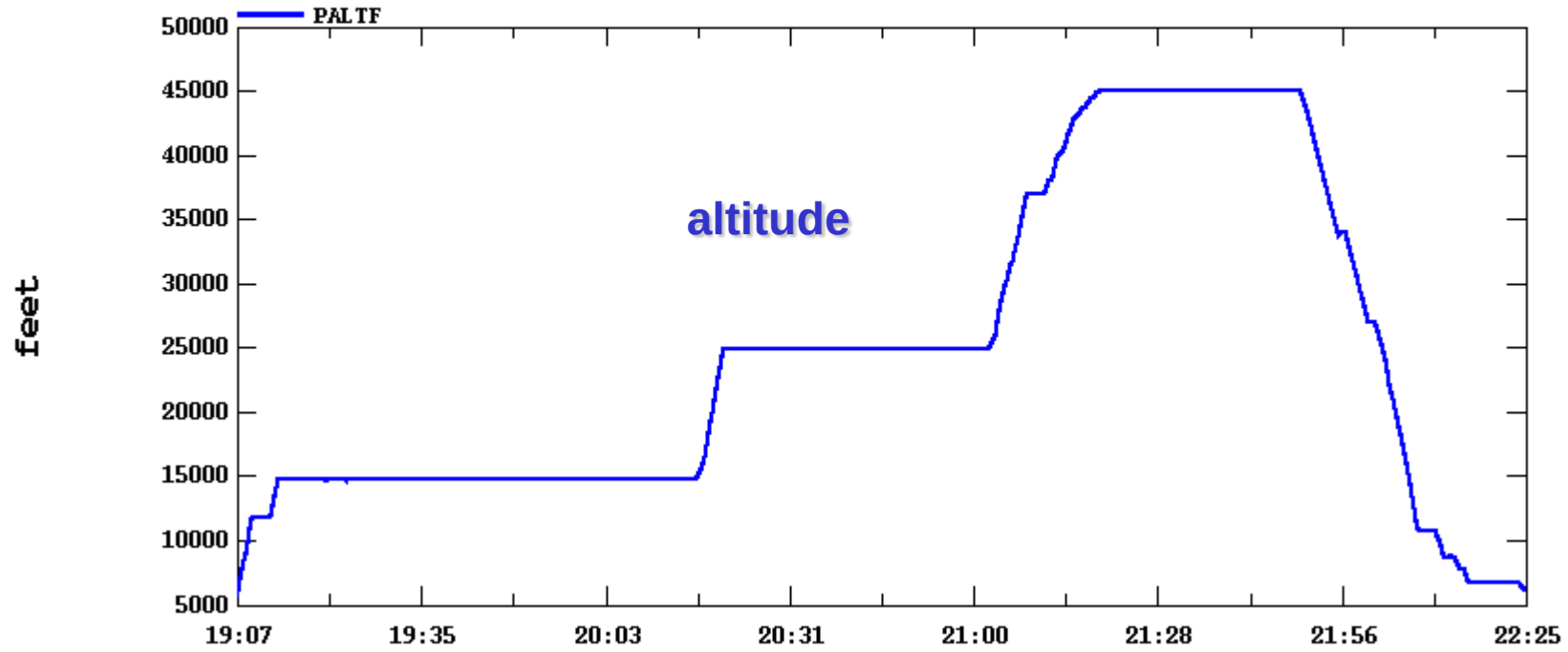
Size distributions, altitude profile

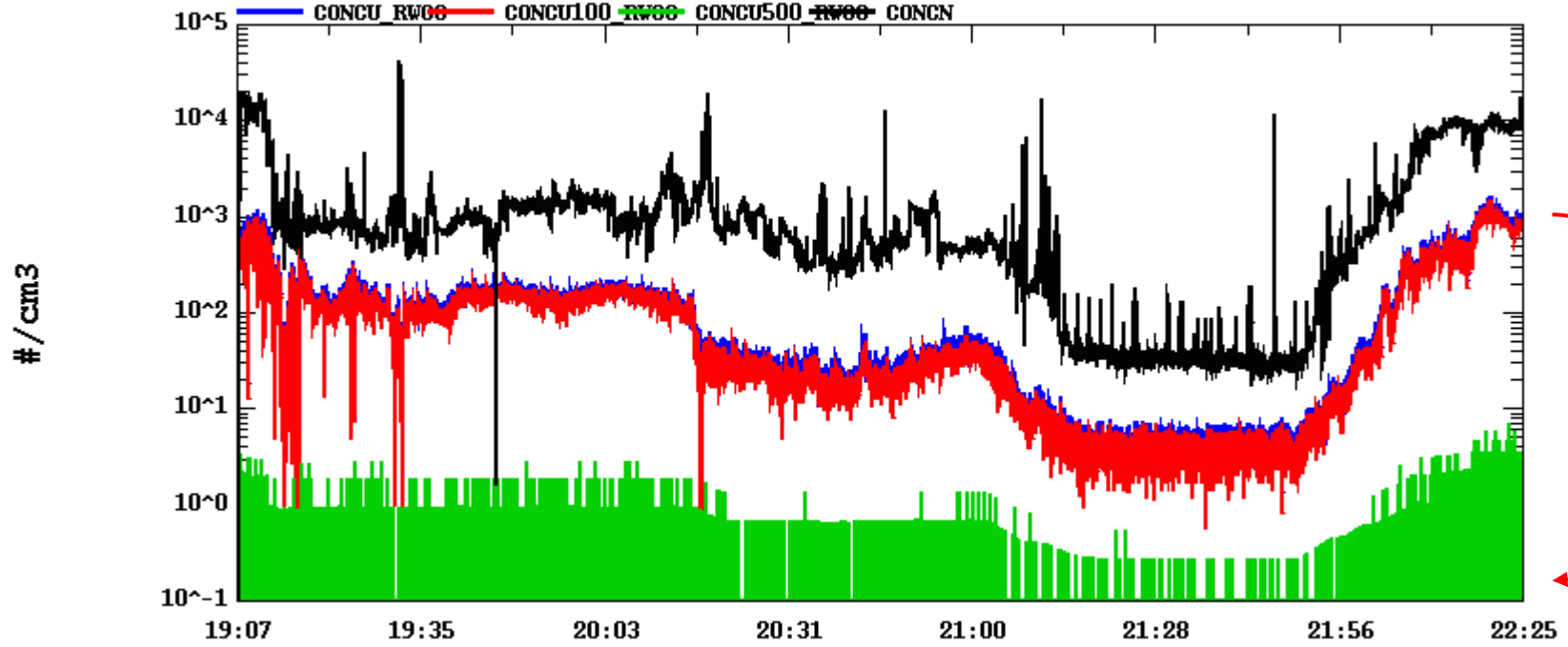


Nucleation mode aerosol particles < ~20 nm

- Water-based CN counter (WCN)
  - *total conc, particles larger than ~7 nm*
  - *10 sps*
  - *~1 sec response*
  - *Commercial instrument*
- rack-mount, with aerosol inlet
- TORERO, use 2 WCN & adjust thresh to 7 nm and 20 nm = *development pro*
- On-board operator not needed

Data from DC-3 Test RF02 (May 2011)

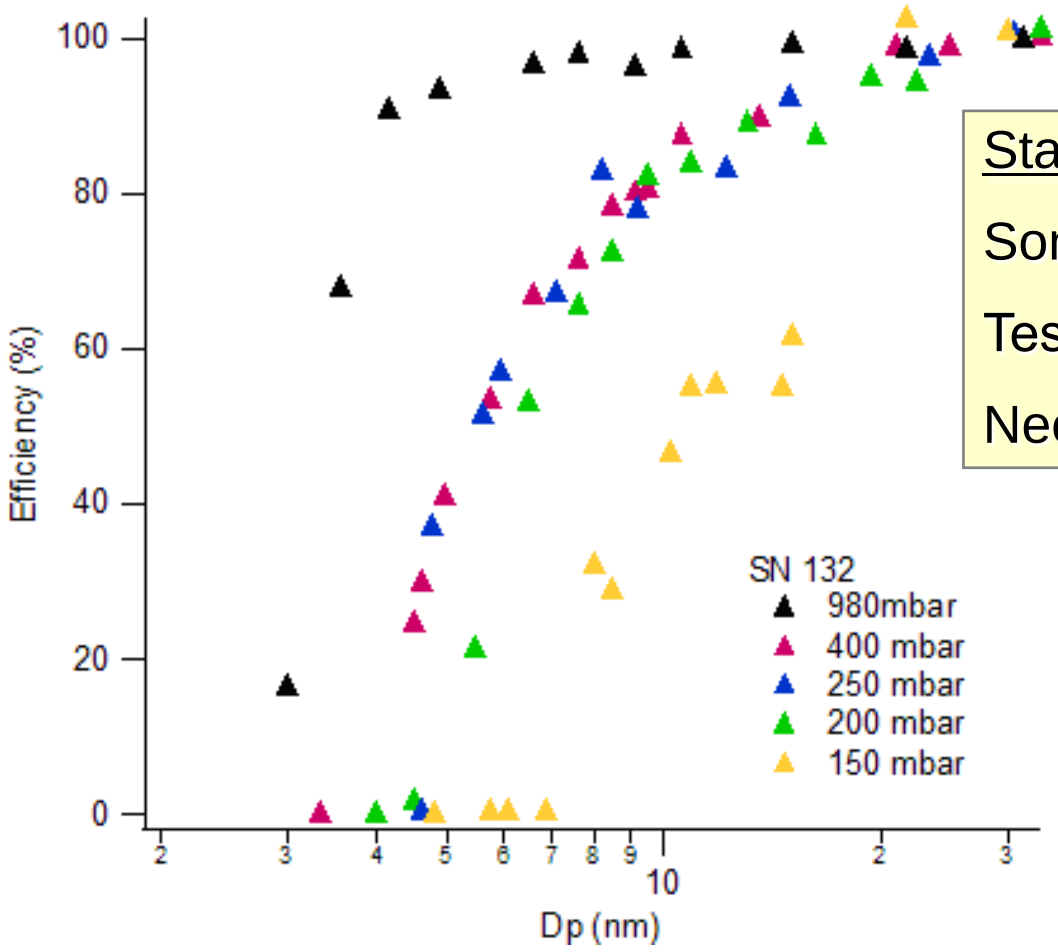




CN

uhsas

WCN performance
threshold detection size



Status:

Some lab tests → promising

Testing WCN's on C-130 now

Need calibrations to get sensitivity

WCN performance

Threshold detection size depends on vapor supersaturation